CHAPTER 18

Study Guide

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Key Concepts

18.1 Rates of Reaction

- The rate of a chemical reaction is usually expressed as the change in the amount of a reactant per unit time.
- Factors that influence the rate of a chemical reaction are temperature, concentration, particle size, and the use of a catalyst.

18.2 Reversible Reactions and Equilibrium

- Chemical equilibrium is a state in which the forward and reverse reactions take place at the same rate. At chemical equilibrium, no net change occurs in the system.
- Stresses that can alter the equilibrium position of a reaction are changes in the concentrations of reactants or products, changes in temperature, and changes in pressure.
- A K_{eq} value greater than 1 means that products are favored over reactants; a K_{eq} less than 1 means that reactants are favored over products.

18.3 Solubility Equilibrium

- The smaller the numerical value of the solubility product constant, the lower the solubility of the compound.
- A precipitate will form if the product of the concentrations of two ions in a mixture is greater than the K_{sp} of the compound formed from the ions.

Test Date:

18.5 The Progress of Chemical Reactions

- The value of the specific rate constant, k, in the rate equation is large if products form quickly from reactants.
- Graphs of the progress of a reaction show peaks that correspond to the energies of activated complexes and valleys that correspond to the energies of intermediates and products.

Vocabulary

- activated complex (p. 544)
- activation energy (p. 543)
- chemical equilibrium (p. 550)
- collision theory (p. 542)
- common ion (p. 563)
- common ion effect (p. 563)
- elementary reaction (p. 578)
- Le Châtelier's principle (p. 552)
- rate (p. 542)
- rate law (p. 575)
- reaction mechanism (p. 578)
- reversible reaction (p. 549)
- solubility product constant (p. 561)
- specific rate constant (p. 575)
- equilibrium constant (p. 556)
- equilibrium position (p. 551)
- first-order reaction (p. 576)
- inhibitor (p. 547)
- intermediate (p. 578)
- transition state (p. 544)

Key Equations

- $K_{eq} = \frac{[C]^c \times [D]^d}{[A]^a \times [B]^b}$

$aA + bB \rightleftharpoons cC + dD$

- rate = $k[A]^a[B]^b$

$K_{sp}=[C]^c[D]^d$

Problems:
Activation energy diagram interpretation.
Common Ion Effect
Precipitation
Solubility Product
Equilibrium value using expression